

Case Study No.6

Innovative Prefabrication, Lifetime Home and Local Sourcing

West of Scotland Housing Association, Mainholm Road, Ayr

Type:	New build, steel frame, terrace and semi-detached			
Number of units:	20			
SAP rating:	114			
U-values:	0.1-0.21 Wm ² C roof 0.17 Wm ² C walls 0.23-0.25 Wm ² C floor			
Fuel costs:	£0.75 pw (predicted)			
Works costs:	£875,500			
Unit cost:	£43,750			
Completion date:	September 1999			
Contacts:	Client:	West of Scotland Housing Association	Fiona Birse	0141 553 1413
	Architect:	Assist Architects	Monica McGhee	0141 554 0505
	Builder:	Robinson and Davidson	Alex Steel	0141 332 8837

The site selected was a semi-rural greenfield one on the edge of the town within reasonable distance of local amenities. Despite the awkward shape and confined nature of the site 75% of the dwellings benefit from passive solar gain. The whole development is barrier free and car parking satisfies barrier free requirements. The housing has a traditional mix of 1,2,and 3 bedrooms.



Figure 6.1 Site Plan

Key Features

Resource Conservation

Pre-fabricated construction, local sourcing

The housing is uniquely manufactured from galvanised steel panels which make up the walls, floor and roof structure. The partnership formed between the client, the builder and a local steel fabrication plant (Ayrshire Metals) has helped this housing development to contribute considerably to the local economy. The technology of steel housing has developed since earlier versions in the 1970's and this system now offers the following advantages:

- faster construction
- accurate sizing which reduces waste
- lightweight for easy handling
- flexible and adaptable system for lifetime homes
- high acoustic and thermal insulation
- fire and insect resistant
- fully recyclable and re-useable
- advanced technology of protecting steel with "self-healing" coating
- "breathing wall" construction allows moisture to escape but with low air leakage rate



Figure 6.2 Steel construction increases efficiency in housing construction.

Social and Management

Lifetime homes, contractual partnership

Each dwelling is designed to be highly flexible and adaptable over time to allow for disability needs. There is a "knock-out" panel in the bathroom to allow for future fitting of a hoist as well as additional space to allow for wheelchair use. Services have been accommodated in the ceiling void or external wall thickness to allow changes to be made to the layout.

The use of a partnership arrangement from the outset between the client, builder, architect and steel fabricator has resulted in highly constructive management of problems with joint solutions provided. The traditional pitfall of the design and build post tender savings exercise has been avoided.



Figure 6.3 Solar porches as entrances help reduce air leakage

Other Relevant Aspects

The Site

Shelterbelt, indigenous planting

The site has a continuous row of mature trees which have been both preserved and enhanced with new planting. This provides good shelter for the site from prevailing westerly winds. Existing planting has been maintained where possible and enhanced with indigenous species to promote appropriate biodiversity.

Energy

High insulation, passive ventilation, solar porches, mechanical heat recovery system

Wall insulation: 150 mm Rockwool quilt and 75 mm Flax/Rockwool "Heraklith" boarding

Roof insulation: 300 mm Rockwool to loft

Floor insulation: 75 mm Jablite polystyrene boarding

Solar porches are single glazed and narrow to prevent their use as another room. They provide an effective draught lobby to the main house and a small amount of pre-heated ventilation.

Exceptionally high insulation levels have been achieved by overcladding the steel frame with insulation boards as well as filling the structural void. Passive ventilation has been used on the 14 houses which have condensing boiler heating systems. In an attempt to overcome traditional oversizing of boilers in relation to well insulated housing, 6 of the houses use a mechanical heat recovery system as an alternative. This has significantly reduced the size of the boiler which is now needed for hot water only.

Costs and Maintenance

Costs for this scheme are within an agreed budget with Scottish Homes and relatively low given the innovative nature of the construction. Considerable space has been gained by increasing the efficiency of the structure. No cavity is required in the wall construction and the flax-covered external insulation board can receive render directly, simplifying much of the detailing.